

Amendment to the specification

Please amend the paragraph bridging pages 1-2 to read as follows:

3,3'-Diallyl-4,4'-dihydroxydiphenyl sulfone is a useful substance as a developer for a thermal recording material or a polymer additive. It is proposed to synthesize 3,3'-diallyl-4,4'-dihydroxydiphenyl sulfone by Claisen rearrangement of 4,4'-diallyloxydiphenyl sulfone. For example, 4,4'-diallyloxy-diphenyl sulfone is reacted in a trichlorobenzene solvent at 216 to ~~219°C~~ 219°C for 10 hours to obtain the substance with melting point of 139 to ~~144°C~~ 144°C in 93.3% yield (patent literature 1 (JP-A-169456)). Also, 4,4'-diallyloxy-diphenyl sulfone, having alkali content reduced to not higher than 50 ppm as based on NaOH is reacted in a paraffinic solvent at 205 to ~~210°C~~ 210°C for 7 hours to obtain 96.2% (JP-A-2002-3006) or 97.1% (JP-A-2002-30065) as composition ratio (purity) determined by HPLC after purification. Any of these methods had defect in that the reaction should be carried out in long period, for example, 7 to 10 hours and at high temperature of not lower than ~~200°C~~ 200°C. Low yield such as about 70% as mole ratio based on charged raw material was also a problem.

Please amend the paragraph bridging pages 5-6 to read as follows:

Microwave used in the present invention may be any one of electromagnetic wave having frequency of usually at 300 MHz to 30 GHz. An industrially used microwave generator adopts at 2450 MHz or 918 MHz, therefore such the generator may usually be used. Irradiation time depends on charge amount, watt of a microwave irradiator and so on and definite time is not specified unconditionally, however, it is usually 1 to 60 minutes at 100W to 10 KW after elevation to reaction temperature. In view of easiness of reaction control, it is preferable to complete a reaction in about 5 to 30 minutes. Reaction temperature is controlled in the range from 150 to 350°C 350°C, preferably 230 to 300°C 300°C and more preferably 240 to 290°C 290°C by intermittent irradiation (on-off) of electromagnetic wave. Experimental equipment with microwave irradiation is manufactured and sold from, for example, Milestone Co., CEM Co., Microelectronics Co., and the like.

Please amend the paragraph bridging pages 11-12 to read as follows:

To a quartz flask equipped with a temperature sensor and a magnetic stirrer, 10.00 g of 4,4'-diallyloxydiphenyl sulfone and 0.01 g of N,N-dimethylaniline were charged, followed by purging with nitrogen. Under nitrogen flow, 2450 MHz microwave was irradiated at 100 W, followed by melting at  $160^{\circ}\text{C}$   $160^{\circ}\text{C}$  and then reaction was continued for 5 minutes while maintaining reaction temperature at  $280^{\circ}\text{C}$   $280^{\circ}\text{C}$  by on-off control of irradiation. The reaction products were analyzed by high performance liquid chromatography (area % by high performance liquid chromatography; the same hereinafter): 3,3'-diallyl-4,4'-dihydroxy-diphenyl sulfone (hereinafter abbreviated as the di-rearranged compound) 89.5%, 3-allyl-4-hydroxy-4'-allyloxydiphenyl sulfone (hereinafter abbreviated as the mono-rearranged compound) 1.4%, 5-(3-allyl-4-hydroxyphenylsulfonyl)-1-oxa-2-methylindane (hereinafter abbreviated as the indane-type compound) 1.1%, 3-allyl-4,4'-dihydroxy-diphenyl sulfone (hereinafter abbreviated as the mono-allyl compound) 1.5%, isomers 0.8% and dimers 1.8%.

Please amend the last paragraph on page 12 to read as follows:

To a quartz flask equipped with a temperature sensor and a magnetic stirrer, 10.00 g of 4,4'-diallyloxydiphenyl sulfone and 0.01 g of N,N-dimethylaniline were charged, followed by purging with nitrogen. Under nitrogen flow, 2450 MHz microwave was irradiated at 100 W, followed by melting at ~~160°C~~ 160°C and reaction was continued for 20 minutes while maintaining reaction temperature at ~~255°C~~ 255°C by on-off control of irradiation. Thus obtained-reaction products were analyzed by high performance liquid chromatography: the di-rearranged compound 91.1%, the mono-rearranged compound 1.6%, the indane-type compound 1.0%, the mono-allyl compound 1.1%, isomers 0.6% and dimers 1.4%.

Please amend the second full paragraph on page 13 to read as follows:

To a quartz flask equipped with a temperature sensor and a magnetic stirrer, 10.00 g of 4,4'-diallyloxydiphenyl sulfone was charged, followed by purging with nitrogen. Under nitrogen flow, 2450 MHz microwave was irradiated at 100 W, followed by melting at ~~160°C~~ 160°C and reaction was continued for 5 minutes while maintaining reaction

temperature at  $280^{\circ}\text{C}$   $280^{\circ}\text{C}$  by on-off control of irradiation. Thus obtained reaction products were analyzed by high performance liquid chromatography: the di-rearranged compound 87.4%, the mono-rearranged compound 1.9%, the indane-type compound 1.7%, the mono-allyl compound 2.6%, isomers 1.7% and dimers 1.9%. By purifying thus obtained reaction product by the method according to Example 1, purified 3,3'-diallyl-4,4'-dihydroxydiphenyl sulfone with purity of 96% to 98% can be obtained in 80% to 90% yield.

Please amend the paragraph bridging pages 13-14 to read as follows:

To a quartz flask equipped with a temperature sensor and a magnetic stirrer, 10.00 g of 4,4'-diallyloxydiphenyl sulfone and 10 mg of 1,10-phenanthroline were charged, followed by purging with nitrogen. Under nitrogen flow, 2450 MHz microwave was irradiated to them at 100 W and, after melting thereof at  $160^{\circ}\text{C}$   $160^{\circ}\text{C}$ , reaction temperature was elevated to  $280^{\circ}\text{C}$   $280^{\circ}\text{C}$  and then reaction was continued for 5 minutes while maintaining reaction temperature at  $280^{\circ}\text{C}$   $280^{\circ}\text{C}$  by on-off control of irradiation. The reaction

products were analyzed by high performance liquid chromatography was: the di-rearranged compound 90.5%, the mono-rearranged compound 1.5%, the indane-type compound 1.5%, the mono-allyl compound 1.5%, unidentified compounds 0.8% and dimers 1.6%.

Please amend the paragraph bridging pages 14-15 to read as follows:

To a pyrex flask equipped with a temperature sensor and a magnetic stirrer, 10.00 g of 4,4'-diallyloxydiphenyl sulfone, 5 mg of 1,10-phenanthroline and 5 mg of ascorbic acid were charged, followed by purging with nitrogen. Under nitrogen flow, they were heated by an electric heater. After melting thereof at  $160^{\circ}\text{C}$   $160^{\circ}\text{C}$ , 2450 MHz microwave at 100 W was irradiated to elevate the temperature to  $260^{\circ}\text{C}$   $260^{\circ}\text{C}$  and reaction was continued for 16 minutes while maintaining reaction temperature at  $280^{\circ}\text{C}$   $280^{\circ}\text{C}$  by on-off control of irradiation. Analysis value of reaction products thus obtained by high performance liquid chromatography was: the di-rearranged compound 93.6%, the mono-rearranged compound 1.3%, the indane-type compound 1.2%, the mono-allyl compound

0.3%, unidentified components 0.6% and dimers 1.2%. By purifying thus obtained reaction product by the method according to Example 1, 8.70 g (87% yield) of purified 3,3'-diallyl-4,4'-dihydroxydiphenyl sulfone were obtained. Thus obtained products were analyzed by high performance liquid chromatography: Content of di-rearranged compound; 97.5%.

Please amend the paragraph bridging pages 15-16 to read as follows:

To a Pyrex flask equipped with a temperature sensor and a magnetic stirrer, 10.00 g of 4,4'-diallyloxydiphenyl sulfone, 5 mg of EDTA and 5 mg of ascorbic acid were charged, followed by purging with nitrogen. Under nitrogen flow, 2450 MHz microwave at 100 W was irradiated to elevate the temperature to  $260^{\circ}\text{C}$   $260^{\circ}\text{C}$  and reaction was continued for 16 minutes while maintaining reaction temperature at  $260^{\circ}\text{C}$   $260^{\circ}\text{C}$  by on-off control of irradiation. Analysis value of reaction products thus obtained by high performance liquid chromatography was: the di-rearranged compound 91.8%, the mono-rearranged compound 1.1%, the indane-type compound 1.2%, the mono-allyl compound 0.4%, unidentified components

0.8% and dimers 1.9%. By purifying thus obtained reaction product by a method according to Example 1, 8.50 g (85.0% yield) of purified 3,3'-diallyl-4,4'-dihydroxydiphenyl sulfone were obtained. Thus obtained products were analyzed by high performance liquid chromatography: Content of di-rearranged compound; 97.2%.

Please amend the paragraph bridging pages 16-17 to read as follows:

To a 100 ml flask equipped with a temperature sensor, a stirrer and a condenser, 20 g of trichlorobenzene, 10.00 g of 4,4'-diallyloxydiphenyl sulfone, 10 mg of o-phenanthroline and 10 mg of ascorbic acid were charged, followed by purging with nitrogen. Under nitrogen flow, while heating by an oil bath, reaction was continued at ~~210°C~~ 210°C for 7 hours. Thus obtained reaction products were analyzed by high performance liquid chromatography: the di-rearranged compound 95.3%, the mono-rearranged compound 2.2%, the indane-type compound 0.7%, the mono-allyl compound 0.1%, unidentified compounds 0.1% and dimers 0.5%. A trichlorobenzene solution of reaction products was extracted

with an aqueous solution of 10% by weight of sodium hydroxide while heating. A small amount of activated carbon to the extract and stirring for decolorization treatment. After separation of activated carbon by filtration, sulfuric acid of 20% concentration was added to the filtrate to neutralize and precipitate crystals. Purified 3,3'-diallyl-4,4'-dihydroxydiphenyl sulfone was obtained in amount of 8.80 g (in 88.0% yield). Thus obtained products were analyzed by high performance liquid chromatography: Content of di-rearranged compound; 97.0%.